

Amendments to the Claims:

Claims 1-67 have been canceled without prejudice. Claims 68 and 91 have been amended. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. - 67. (Canceled)

68. (Currently Amended) A computer-implemented method for use in creating a digital model of a tooth in a patient's dentition, the method comprising:

- (a) receiving a three-dimensional (3D) data set representing the patient's dentition;
- (b) applying a computer-implemented test to the 3D data set to identify data elements that represent an interproximal margin between two teeth in the dentition, wherein applying the computer-implemented test includes;
 - identifying elements of the data set that represent the interproximal margin, and
 - labeling those data elements as belonging to the interproximal margin; and
- (c) applying another computer-implemented test to select data elements that lie on one side of the interproximal margin for inclusion in the digital model of the tooth.

69. (original) The method of claim 68, further comprising creating a set of 2D planes that intersect the dentition roughly perpendicular to an occlusal plane of the dentition, each 2D plane including data elements that form a 2D cross-section of the dentition.

70. (original) The method of claim 69, further comprising identifying the 2D plane with the smallest cross-sectional area.

71. (original) The method of claim 70, further comprising rotating the 2D plane with the smallest cross-sectional area to at least one other orientation to form at least one other 2D cross-section of the dentition.

72. (original) The method of claim 71, further comprising selecting the orientation that gives the rotated plane its smallest possible cross-sectional area.

73. (original) The method of claim 72, further comprising identifying data elements that represent the selected orientation of the rotated plane as lying on an interproximal margin.

74. (original) The method of claim 71, wherein the plane is rotated about two orthogonal lines passing through its center point.

75. (original) The method of claim 70, further comprising creating a set of additional 2D planes in the vicinity of the 2D plane with the smallest cross-sectional area.

76. (original) The method of claim 75, further comprising identifying the plane in the set of additional planes that has the smallest cross-sectional area.

77. (original) The method of claim 76, further comprising rotating the plane with the smallest cross-sectional area to at least one other orientation to form at least one other 2D cross-section of the dentition.

78. (original) The method of claim 77, further comprising selecting the orientation that produces the 2D cross-section with the smallest possible area.

79. (original) The method of claim 69, wherein creating a set of 2D planes includes creating an initial plane near one end of the dentition.

80. (original) The method of claim 79, further comprising selecting a point in the dentition that is a predetermined distance from the initial plane and creating a second plane.

81. (original) The method of claim 80, wherein the second plane is roughly parallel to the initial plane.

82. (original) The method of claim 80, further comprising rotating the second plane to at least one additional orientation to form at least one additional 2D cross-section of the dentition.

83. (original) The method of claim 82, further comprising selecting the orientation that produces the 2D cross-section with the smallest cross-sectional area.

84. (original) The method of claim 82, further comprising selecting a point that is a predetermined distance from the second plane and creating a third plane that includes the selected point.

85. (original) The method of claim 84, further comprising rotating the third plane to at least one other orientation to create at least one additional 2D cross-section of the dentition.

86. (original) The method of claim 84, further comprising creating additional planes, each including a point that is a predetermined distance from a preceding plane, until the other end of the dentition is reached.

87. (original) The method of claim 86, further comprising identifying at least one plane having a local minimum in cross-sectional area.

88. (original) The method of claim 86, further comprising identifying a centerpoint of the cross-section in each of the planes and creating a curve that fits among the identified centerpoints.

89. (original) The method of claim 88, further comprising creating a set of additional 2D planes along the curve, where the curve is roughly normal to each of the additional planes, and where each of the additional planes is roughly perpendicular to the occlusal plane.

90. (original) The method of claim 89, further comprising identifying at least one of the additional planes that has a local minimum in cross-sectional area.

91. (Currently Amended) A computer-implemented method for use in creating a digital model of a tooth in a patient's dentition, the method comprising:

(a) receiving a 3D dataset representing at least a portion of the patient's dentition, including at least a portion of a tooth and gum tissue surrounding the tooth;

(b) applying a test to the 3D dataset to identify data elements lying on a gingival boundary that occurs where the tooth and the gum tissue meet, wherein applying the computer-implemented test includes;

identifying elements of the data set that represent the gingival boundary,
and

labeling those data elements as belonging to the gingival boundary; and

(c) applying a test to the data elements lying on the boundary to identify other data elements representing portions of the tooth.

92. (original) The method of claim 91, wherein applying the test to identify data elements on the gingival boundary includes creating an initial 2D plane that intersects the dentition roughly perpendicular to an occlusal plane of the dentition and that includes data elements representing an initial cross-sectional surface of the dentition.

93. (original) The method of claim 91, wherein applying the test to identify data elements on the gingival boundary includes creating a series of roughly parallel 2D planes, each intersecting the dentition roughly perpendicular to an occlusal plane of the dentition, and each including data elements that represent a cross-sectional surface of the dentition.

94. (original) The method of claim 93, wherein the cross-sectional surface in each 2D plane includes two cusps that roughly identify the locations of the gingival boundary.